

What is claimed is:

1. A display device having a level converting circuit including thin film transistors formed on a substrate, wherein  
5 the level converting circuit converts non-differential input signals having an amplitude of 1.2V or less into signals having a larger amplitude.

2. A display device according to claim 1, wherein the input  
10 signals are signals which have an amplitude smaller than a twofold value of a threshold voltage of the thin film transistors.

3. A display device according to claim 2, wherein the input signals are signals which have an amplitude equal to or less than 1.6 times of a threshold voltage of the thin film transistors.

4. A display device according to claim 2, wherein the input  
15 signals are signals which have an amplitude equal to or more than a threshold voltage of the thin film transistors and equal to or less than 1.6 times of a threshold voltage of the thin film transistors.

5. A display device according to claim 1, wherein the input  
20 signals are either control signals or display data.

6. A display device according to claim 1, wherein the input signals are control signals, and

the level converting circuit includes:

a first-conductive-type first transistor which is  
25 connected between a first power source line to which a first

voltage is supplied and an output terminal and has a gate electrode to which the input signals are applied through a first capacitive element;

5 a second-conductive-type second transistor which is connected between the output terminal and a second power source line to which a second voltage is supplied and has a gate electrode to which the input signals are applied through a second capacitive element;

10 a first bias circuit which applies a first bias voltage to the gate electrode of the first transistor; and

a second bias circuit which applies a second bias voltage to the gate electrode of the second transistor, wherein

15 the first bias voltage is a voltage which turns off the first transistor when a voltage applied to the gate electrode of the first transistor assumes a maximum value, and

the second bias voltage is a voltage which turns off the second transistor when a voltage applied to the gate electrode of the second transistor assumes a minimum value.

20 7. A display device according to claim 6, wherein the first bias voltage is a voltage which allows a maximum value of a voltage applied to the gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a threshold voltage of the first transistor from the first voltage, and

25 the second bias voltage is a voltage which allows a minimum value of a voltage applied to the gate electrode of the second

transistor to assume a voltage value which is obtained by adding a threshold voltage of the second transistor to the second voltage.

8. A display device according to claim 1, wherein the input  
5 signals are display data, and the level converting circuit includes:

a sample holding circuit which performs sampling of the input signals;

a transistor having a gate electrode to which an output  
10 voltage of the sample holding circuit is applied;

a first switching element having a first electrode which is connected to a first power source line to which a first voltage is supplied;

a second switching element having a second electrode which  
15 is connected to a second electrode of the first switching element and a first electrode which is connected to the second electrode of the transistor;

a voltage holding circuit being connected to a second electrode of the second switching element;

20 an inverter circuit being connected between the first power source line and a second power source line to which a second voltage is supplied, an output voltage of the voltage holding circuit being inputted to the inverter circuit; and

a bias circuit applying a bias voltage to a first electrode  
25 of the transistor, wherein the bias voltage is a voltage which

turns off the transistor when a voltage applied to a gate electrode of the transistor assumes a minimum value.

9. A display device according to claim 8, wherein the bias voltage is a voltage obtained by subtracting a threshold voltage  
5 of the transistor from the second voltage.

10. A display device including a first level converting circuit which converts control signals having a small amplitude into signals having a larger amplitude, and

a second level converting circuit which converts display  
10 data having a small amplitude to signals having a larger amplitude, wherein

the first level converting circuit includes:

a first-conductive-type first transistor which is connected between a first power source line to which a first  
15 voltage is supplied and an output terminal and has a gate electrode to which the control signals are applied through a first capacitive element;

a second-conductive-type second transistor which is connected between the output terminal and a second power source  
20 line to which a second voltage is supplied and has a gate electrode to which control signals are applied through a second capacitive element;

a first bias circuit which applies a first bias voltage to the gate electrode of the first transistor; and

25 a second bias circuit which applies a second bias voltage

to the gate electrode of the second transistor, wherein

the first bias voltage is a voltage which turns off the first transistor when a voltage applied to the gate electrode of the first transistor assumes a maximum value, and

5 the second bias voltage is a voltage which turns off the second transistor when a voltage applied to the gate electrode of the second transistor assumes a minimum value, and

the second level converting circuit includes:

a sample holding circuit which performs sampling of the  
10 display data;

a third transistor having a gate electrode to which an output voltage of the sample holding circuit is applied;

a first switching element having a first electrode which is connected to the first power source line;

15 a second switching element having a second electrode which is connected to a second electrode of the first switching element and a first electrode which is connected to a second electrode of the third transistor;

a voltage holding circuit being connected to a second  
20 electrode of the second switching element;

an inverter circuit being connected between the first power source line and the second power source line, wherein an output voltage of the voltage holding circuit is inputted to the inverter circuit; and

25 a third bias circuit applying a third bias voltage to a

first electrode of the third transistor, wherein the third bias voltage is a voltage which turns off the third transistor when a voltage applied to a gate electrode of the third transistor assumes a minimum value.

5           11. A display device according to claim 10, wherein the first bias voltage is a voltage which allows a maximum value of a voltage applied to a gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a threshold voltage of the first transistor from the first voltage,  
10   and

          the second bias voltage is a voltage which allows a minimum value of a voltage applied to a gate electrode of the second transistor to assume a voltage value which is obtained by adding a threshold voltage of the second transistor to the second voltage,  
15   and

          the third bias voltage is a voltage obtained by subtracting threshold voltage of the third transistor from the second voltage.

20           12. A display device according to claim 10, wherein in response to control signals outputted from the first level converting circuit, the first switching element and the second switching element of the second level converting circuit are driven.

25           13. A display device according to claim 10, wherein the first level converting circuit and the second level converting

circuit include thin film transistors formed on a substrate.

14. A display device including a level converting circuit which converts input signals having a small amplitude into signals having a larger amplitude, wherein

5 the level converting circuit includes:

a first-conductive-type first transistor which is connected between a first power source line to which a first voltage is supplied and an output terminal and has a gate electrode to which the input signals are applied through a first capacitive  
10 element;

a second-conductive-type second transistor which is connected between the output terminal and a second power source line to which a second voltage is supplied and has a gate electrode to which the input signals are applied through a second capacitive  
15 element;

a first bias circuit which applies a first bias voltage to the gate electrode of the first transistor; and

a second bias circuit which applies a second bias voltage to the gate electrode of the second transistor, wherein

20 the first bias voltage is a voltage which turns off the first transistor when a voltage applied to the gate electrode of the first transistor assumes a maximum value, and

the second bias voltage is a voltage which turns off the second transistor when a voltage applied to the gate electrode  
25 of the second transistor assumes a minimum value.

15. A display device according to claim 14, wherein the first bias voltage is a voltage which allows a maximum value of a voltage applied to the gate electrode of the first transistor to assume a voltage value which is obtained by subtracting a threshold voltage of the first transistor from the first voltage,  
5 and

the second bias voltage is a voltage which allows a minimum value of a voltage applied to the gate electrode of the second transistor to assume a voltage value which is obtained by adding  
10 a threshold voltage of the second transistor to the second voltage.

16. A display device including a level converting circuit which converts input signals having a small amplitude into signals having a larger amplitude, wherein the level converting  
15 circuits includes:

a sample holding circuit which performs sampling of the input signals;

a transistor having a gate electrode to which an output voltage of the sample holding circuit is applied;

20 a first switching element having a first electrode which is connected to a first power source line to which a first voltage is supplied;

a second switching element having a second electrode which is connected to a second electrode of the first switching element  
25 and a first electrode which is connected to a second electrode



of the transistor;

a voltage holding circuit being connected to a second electrode of the second switching element;

an inverter circuit being connected between the first power  
5 source line and a second power source line to which a second voltage is supplied, an output voltage of the voltage holding circuit being inputted to the inverter circuit; and

a bias circuit applying a bias voltage to a first electrode of the transistor, wherein the bias voltage is a voltage which  
10 turns off the transistor when a voltage applied to a gate electrode of the transistor assumes a minimum value.

17. A display device according to claim 16, wherein the bias voltage is a voltage obtained by subtracting a threshold voltage of the transistor from the second voltage.

15 18. A display device according to claim 14, wherein the level converting circuit includes thin film transistors formed on a substrate.

19. A display device according to claim 16, wherein the level converting circuit includes thin film transistors formed  
20 on a substrate.